

From Using AI to Delegating to AI: Rethinking the Role of AI in Problem Solving

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With the accumulation of big data, AI models have been widely adopted across industrial domains, including the nuclear sector. Since the advent of ChatGPT, and as hallucination issues have been mitigated through retrieval-augmented generation (RAG), delegating tasks to AI agents as collaborators has emerged as a new practice. This represents a major paradigm shift: from using AI as a means (e.g., predictive, anomaly detection, and generative AI models) to delegating to AI as a solution (e.g., self-driving cars, dark factories, AI scientists, and autonomous laboratories). To utilize such AI agents effectively in engineering—particularly in the nuclear domain—an understanding of agent workflows and multi-agent cooperation frameworks is essential. By recognizing the strengths and weaknesses of AI agents, human experts can bridge the gap between expectations and actual performance. Agentic AI systems can thus pave the way for more efficient and reliable operation and maintenance of nuclear power plants. Furthermore, these capabilities are expected to enable more cost-effective and time-efficient design and deployment of next-generation reactors, such as small modular reactors (SMRs), molten salt reactors (MSRs), sodium-cooled fast reactors (SFRs), and high-temperature gas-cooled reactors (HTGRs). This presentation introduces the core components of agentic AI—planning, tool use, memory, and multi-agent orchestration—and demonstrates their applicability to nuclear engineering tasks through practical showcases.

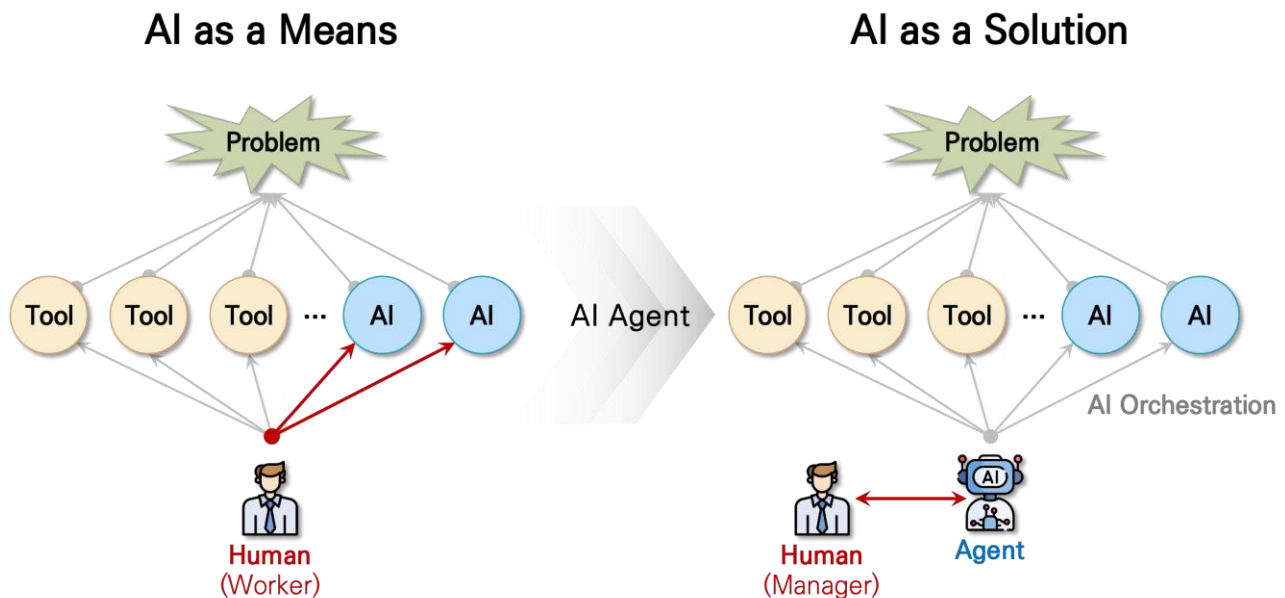


Fig. 1. Paradigm shift in AI utilization: from AI as a means to AI as a solution

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